

# CIC 2014 CCI

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Canadian Immunization Conference  
Conférence canadienne sur l'immunisation

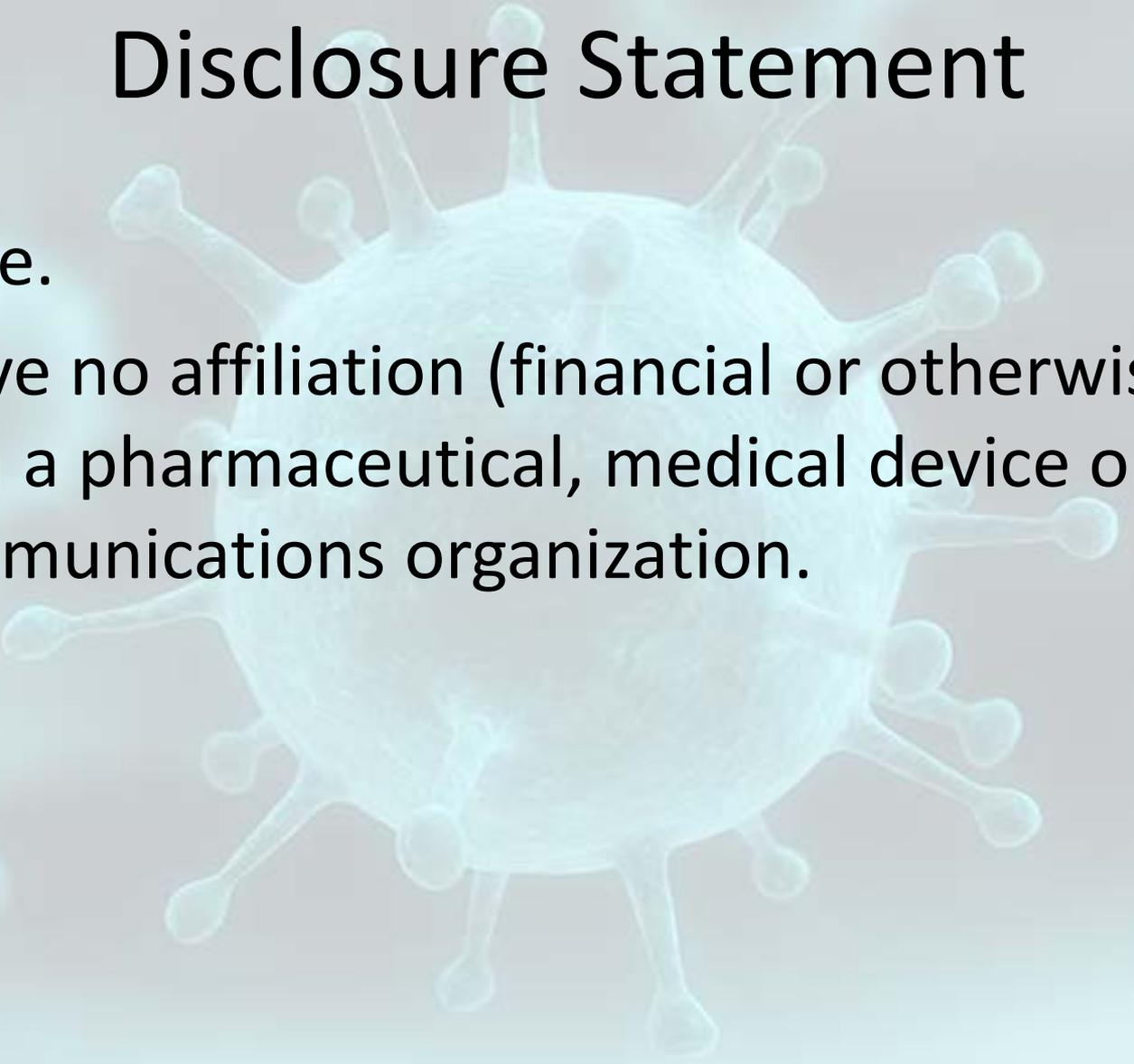
## Immunization Coverage in Canada: A national perspective

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# Disclosure Statement



- None.
- I have no affiliation (financial or otherwise) with a pharmaceutical, medical device or communications organization.

# Outline

- Background information on immunization coverage assessment at the national level
  - » Childhood National Immunization Coverage Survey (cNICS)
  - » Methodology
  - » Validation
  - » Data
- International Reporting Requirements
- Ongoing survey-related work at the Agency

# Background

- The cNICS is conducted by the PHAC to assess immunization coverage for routine childhood vaccines at a **national** level.
- Survey results are used to:
  - » Monitor and evaluate immunization programs
  - » Evaluate progress towards goals from the 2005 National Consensus Conference for Vaccine-Preventable Diseases in Canada
  - » Provide annual statistics to WHO/UNICEF and PAHO
  - » Guide the development of immunization policies
  - » Help identify special populations and/or vaccines with low immunization coverage.

# Childhood National Immunization Coverage Survey

- Childhood immunization coverage surveys started in the early 1990s.
- The aim of the survey has remained the same: obtaining national immunization coverage estimates
- The methodology of the survey has changed over time.
- The survey started as a mail-out survey but is now conducted through telephone interviews.
- The methodology for the telephone interviews has also changed over time.

# Methodology

- Initially, respondents were selected from a convenience sample.
- Selection of participants was then changed to random digit calling in 2004, and relied on a preselected sample in 2011.
- The cNICS uses computer-assisted telephone interviews to obtain the immunization history of children.
- Interviews conducted with parents/guardians, who are asked to retrieve and read their child's immunization record(s).
- In specific cases, child immunization history is obtained from recalls.

# Methodology

- Up-to-date coverage estimates are determined by comparing the age of the child at the time of immunization with the recommended age from the National Advisory Committee on Immunization (NACI) Immunization Schedule for each vaccine dose
- In addition to age, data are also stratified by geographic region and weighted by provincial and territorial populations
- National standards for up-to-date status are also used.

## P/T variation in the Immunization Schedule

- Variation between jurisdictions and over time.
- In the absence of a national immunization schedule, provincial and territorial specific immunization schedules are obtained on a quarterly basis.
- Different immunization schedules increase the complexity of analyzing coverage data
  - » HB provided to infants in some P/Ts, and to adolescents in others
  - » HPV to girls only or to both girls and boys
  - » MMR, MMRV, Varicella
  - » Impact on coverage numerators and denominators
- The analysis plan for the survey needs to take this variation into consideration in terms of the publicly-funded programs to which a child was eligible at different ages.

## An example of the variation in schedules:

Province	Vaccine		
	MMR	Var	MMRV
BC	12 mths	12 mths,	4-6 yrs beginning July 2014
AB			12 mths, 4-6 yrs
SK		Catch-up Gr. 6 until Aug 2015	12, 18 mths
MB			12 mths, 4-6 yrs (started 1 Apr 2014)
ON	12 mths	15 mths	4-6 yrs
QC	12 mths		18 mths
NB		One dose children born between 2000 and 2008; Catch-up 2 doses children born in 2009 or later	12, 18 mths
NS			12 mths, 4-6 yrs
PE			12, 18 mths
NL			12, 18 mths
NT		Catch-up <5 yrs, Gr.9  (students who have received only 1 dose prior)  Catch-up Pre-kindergarten, ≤ 12 yrs (school)	
YT	12 mths, 4-6 yrs	12 mths, 4-6 yrs	

## Impact of changes made to methodology

- Need to be cautious when comparing trends in vaccine coverage and point estimates for a particular vaccine between two survey cycles.
- For instance, information obtained from recall was included for the 2002 cNICS, which may have undermined the accuracy of coverage estimates.
- Furthermore, applying the national standards for up-to-date status, as it was done for post-2002 cNICS cycles may have reduced coverage levels, as children past their eligible birthday were excluded from the numerator.

## Impact of changes made to methodology

- Addition of check questions for multivalent vaccines can also increase coverage estimates.
- Sample size used for the survey has also changed significantly over time.
- An important methodological change was the inclusion of a validation component whereby caregiver responses were compared to information contained in a child's immunization or medical records.
- Previous studies showed that including a validation component can increase coverage estimates by 1 to 12% per antigen, when compared to responses based on parental responses only.

# What are the benefits of validating survey results?

- **Large differences in vaccination coverage rates existed among parents reporting from immunization cards and parents reporting from recall and medical records** (Bolton, P., Holt, E., Ross, A., Hughart, N., Guyer, B. (1998). Estimating vaccination coverage using parental recall, vaccination cards, and medical records. Public Health Rep. 1998).
- **Improves data accuracy and precision of the estimates** (Ghebrehewet, S., Falconer, M., McDonald, P., Schlecht, B. (2003). MMR vaccine uptake rates: a data validation study. *Commun Dis Public Health*, 6(2):144-6; National Immunization Survey. Retrieved from: [http://www.cdc.gov/nchs/nis/about\\_nis.htm](http://www.cdc.gov/nchs/nis/about_nis.htm)).

# Validation of Immunization Coverage Estimates

- Started in 2009 as a pilot study
- 2009 cNICS: validation of childhood immunization coverage data obtained from parents with data in immunization records from health care providers
- Signed consent provided by parents/guardians along with contact information of child's health care provider(s)
- Validation revealed higher immunization coverage estimates than were observed using data from survey respondents.

## Steps in validating survey data

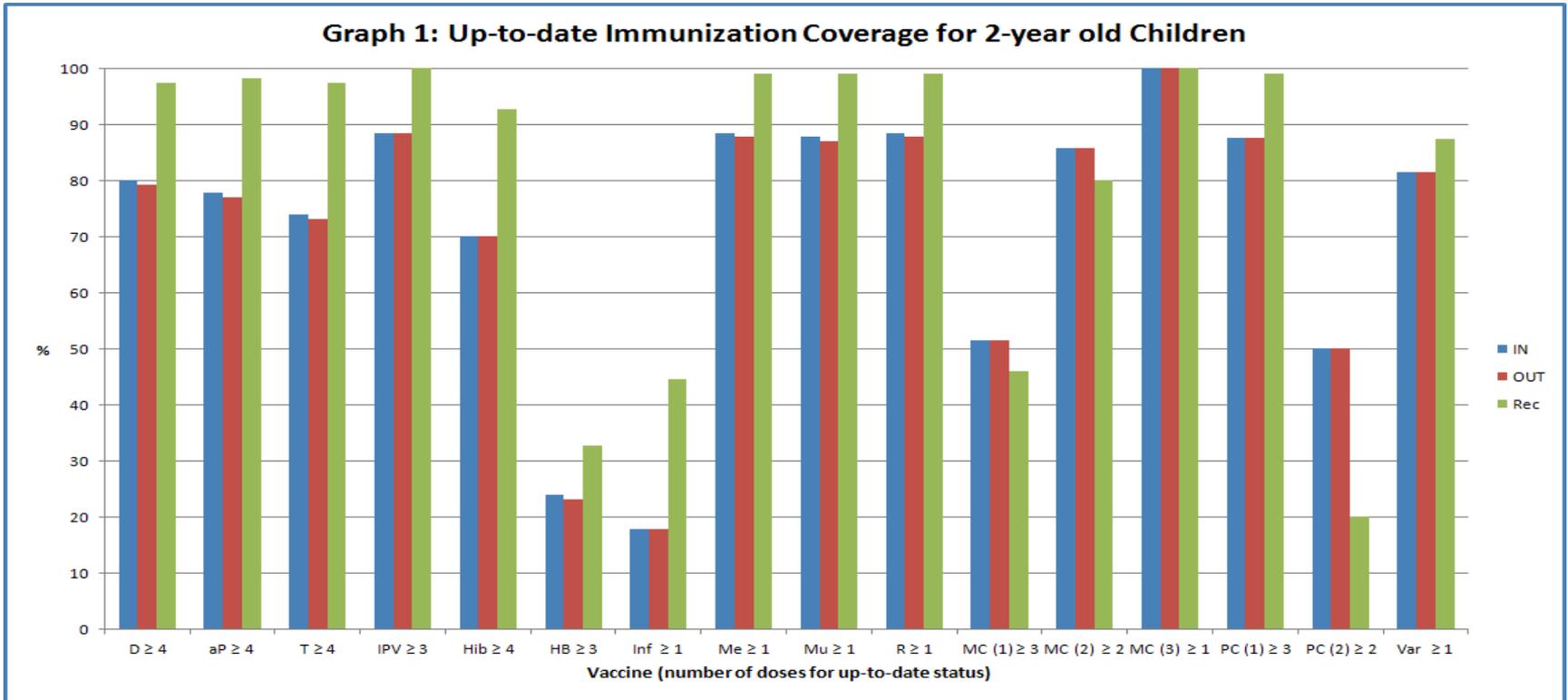
- IT REQUIRES A LOT OF WORK!
- Send out consent forms to parents who verbally consented to participate in the validation of their child immunization data at the time of the interview (45%)
- Randomly select a sample of those who returned their consent form (76%)
- Select the final sample: 2 or 7 years olds, without missing information (able to reach every immunization providers)
- Number of providers per participant (2 years old)

# of Providers	# of Children	Sample %
1	230	100
2	59	26
3	13	6
4	4	2
5	1	< 1

## Steps in validating survey data (con't)

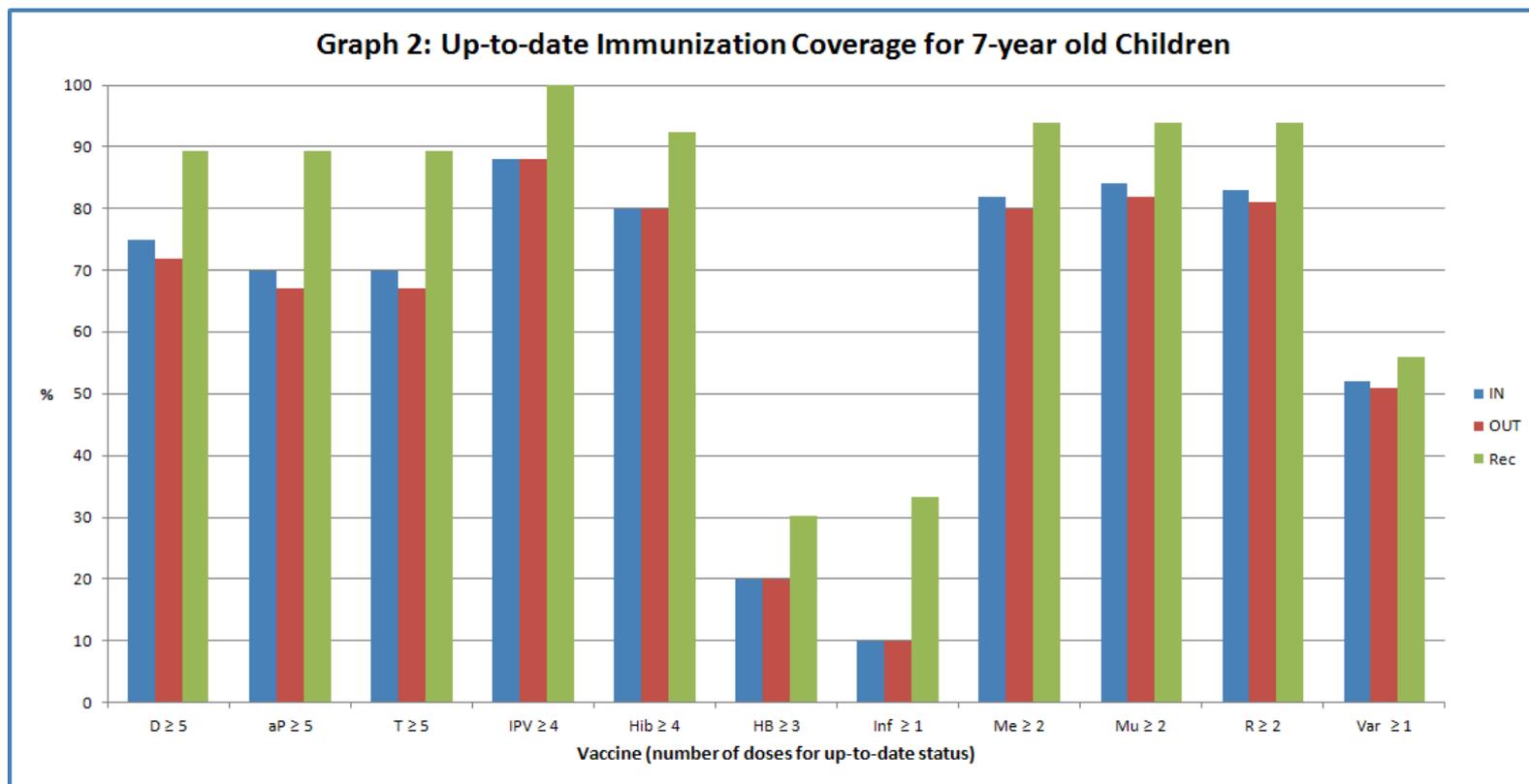
- Send out requests to all the immunization providers – along with reminders
- Collect data and create new database with the immunization events
- Immunization history fully retrieved for 77% of the participants
- Manage missing data using specific rules
- Prepare database for analysis
- Conduct statistical analyses

# Impact of validating Immunization Coverage – 2 Year olds



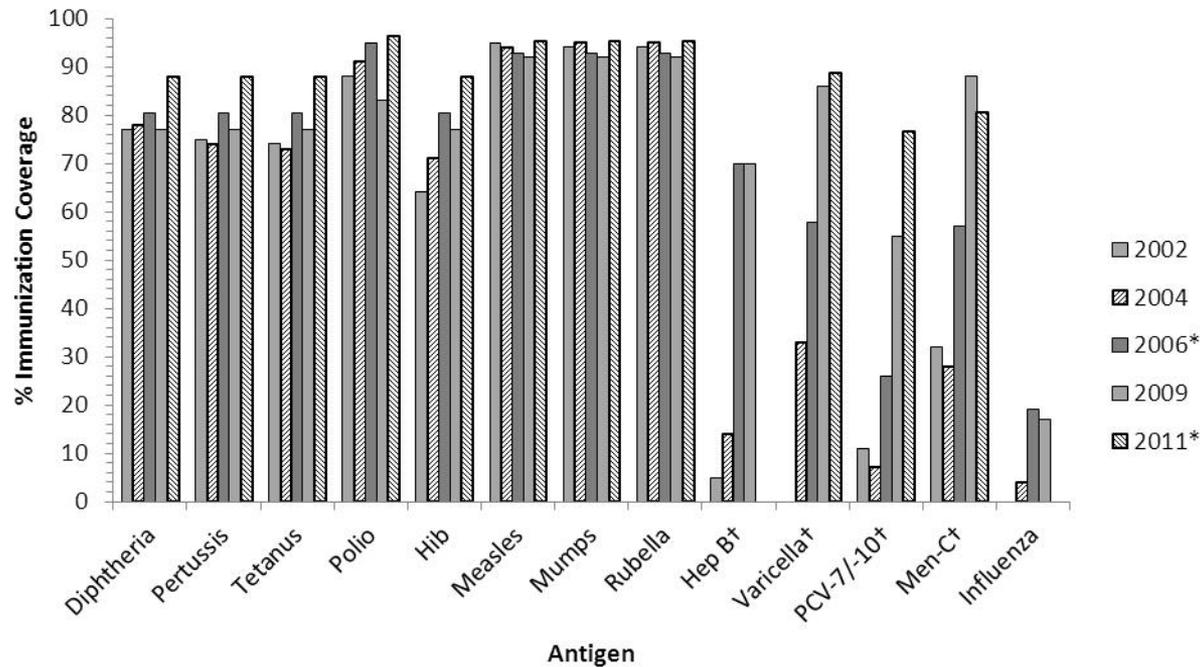
- Differences greater than 20% were found for tetanus, Hib, influenza.
- Statistically significant differences were found for HB, influenza, meningococcal and varicella.

## Impact of validating Immunization Coverage – 7 Year olds

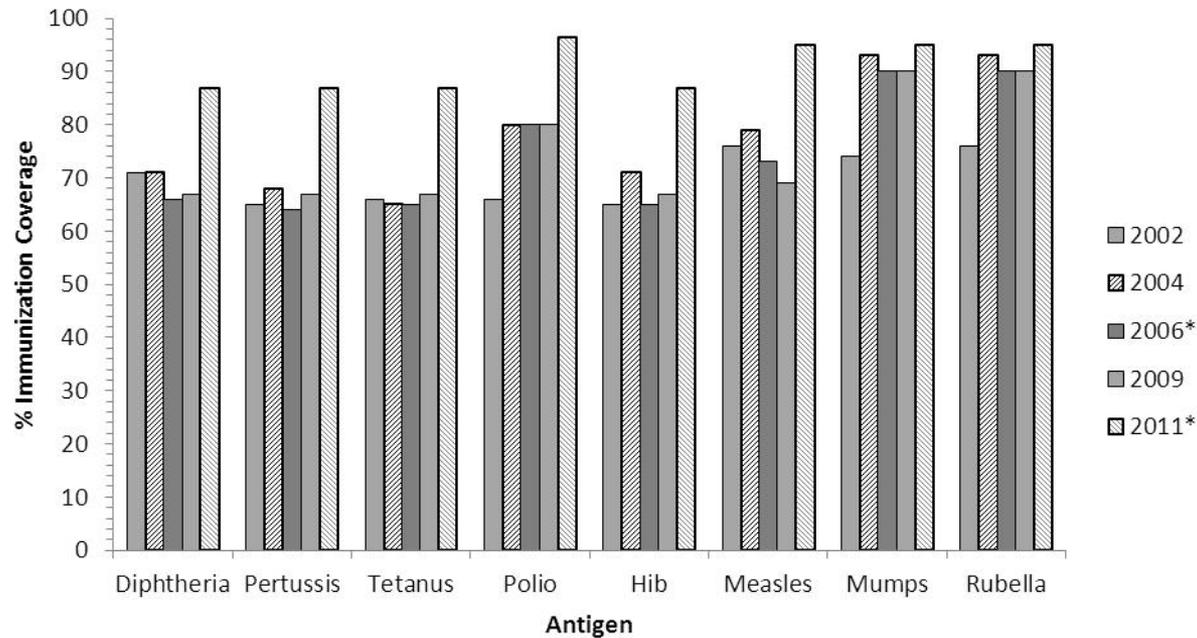


- Difference greater than 20% for influenza .
- Statistically significant differences for diphtheria, pertussis, tetanus, HB, and influenza

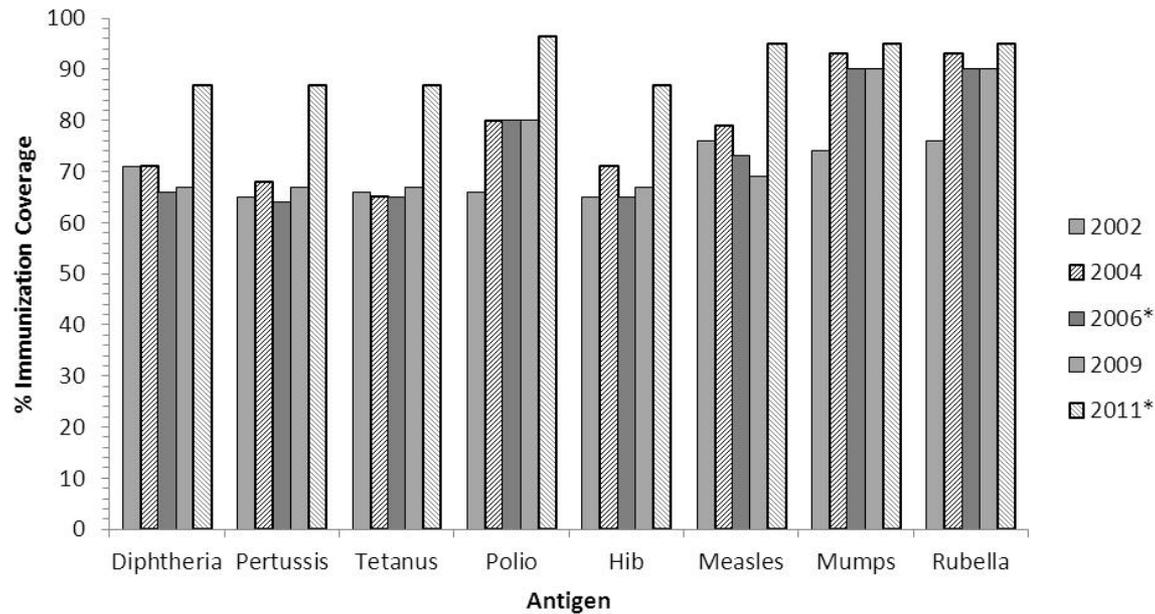
# Up-to-date immunization coverage estimates by antigen by the 2nd birthday from 2002 to 2011



# Up-to-date immunization coverage estimates by antigen by the 7th birthday from 2002 to 2011



# Up-to-date immunization coverage estimates by antigen by the 17th birthday from 2004 to 2011



## How do the cNICS results compare?

- Difficult to compare coverage values obtained from different methods.
- Results prior to validation underestimated immunization coverage.
- Validation has increased coverage estimates but it is unclear how the national estimates compare to the p/t levels immunization coverage data.
  - » Sample size and potential selection bias
  - » Different methodologies used to assess coverage: i.e. surveys, registry-based data, etc.

## International Reporting Requirement to WHO/PAHO and UNICEF

- From the late 1970s until 1998, WHO and UNICEF collected data on national immunization coverage independently at different times during the year.
- To avoid these problems, WHO and UNICEF adopted a joint data collection system and, since 1998, a WHO/UNICEF Joint Reporting Form on Immunization (JRF).
- The JRF annually collects national-level data on the incidence of selected vaccine-preventable diseases, immunization coverage, recommended immunization schedules, vaccine supply and other information on the structure, policies and performance of national immunization systems

# International Reporting Requirement to WHO/PAHO and UNICEF

- PHAC reports national level coverage data to WHO as part of the JRF.
- Annual estimates by country have been available since 1980
  - » For each country, year and vaccine/dose, WHO and UNICEF estimates are presented in both graphic and tabular forms along with the data upon which they are based.
  - » [http://www.who.int/immunization\\_monitoring/en/globalsummary/wucoveragecountrylist.cfm](http://www.who.int/immunization_monitoring/en/globalsummary/wucoveragecountrylist.cfm) and [http://www.childinfo.org/immunization\\_countryreports.html](http://www.childinfo.org/immunization_countryreports.html)

# Moving forward....

- 2013 cNICS: expansion of the sample size
- Analysis of knowledge, attitude and behaviours data
- Examining new ways of presenting data:



## Conclusion

- PHAC/HC has been conducting the cNICS for over 20 years
- The methodology and the sample size of the survey have changed over time
- Since 2009, a validation component has been included in the survey
- Validation of survey results has revealed that data based on parental response underestimates immunization coverage
- PHAC reports national coverage estimates to WHO/UNICEF
- PHAC is examining new ways of presenting national coverage data

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